

Five Species of Syrphidae (Insecta: Diptera) Newly Recorded in Korea

Sang-Wook Suk¹, Deuk-Soo Choi², Ho-Yeon Han^{1,*}

¹Division of Biological Science and Technology, Yonsei University, Wonju 26493, Korea

²Risk Management Division, Animal and Plant Quarantine Agency, Anyang 14033, Korea

ABSTRACT

In Korean Peninsula, a total of 175 syrphid species are currently known. As a result of ongoing systematic study of the family Syrphidae, we have discovered the following five species for the first time in the Korean Peninsula: *Mallota rossica* Portschinsky, 1877, *M. shatalkini* Mutin, 1999, *Sphiximorpha rachmaninovi* (Violovitsh, 1981), *Volucella bivitta* Huo et al., 2007, and *V. inanoides* Hervé-Bazin, 1923. Among these taxa, *Sphiximorpha* Rondani, 1850, is the genus recorded for the first time in Korea. In total, three subfamilies, 16 tribes, 70 genera, and 180 species are now officially recognized for the Korean syrphid fauna. In order to facilitate their identification, we here provide specific diagnoses and color photographs for the species listed.

Keywords: Diptera, Syrphidae, taxonomy, *Mallota*, *Sphiximorpha*, *Volucella*, Korea

INTRODUCTION

Syrphidae is one of the most species rich families of flies including over 6,000 described species in the world (The Diptera Site as of 1 Jun 2015; <http://www.diptera.org/>). In the Korean Peninsula, a total of 175 syrphid species are currently known (Han et al., 2014). Most Korean syrphid species have been recorded as results of faunistic surveys of specific localities of Korea, but such studies prior to the publication of Han and Choi (2001) have often involved many errors. Despite of our intensive survey of Korean syrphid fauna for the last 20 years, we still have not confirmed about 20 previously recorded Korean species, most of which are likely to be erroneous or North Korean only records as indicated by Han and Choi (2001) and Han et al. (2014).

As a result of ongoing systematic study of the family Syrphidae, we have discovered the following five species for the first time in Korea: *Mallota rossica* Portschinsky, 1877, *M. shatalkini* Mutin, 1999, *Sphiximorpha rachmaninovi* (Violovitsh, 1981), *Volucella bivitta* Huo et al., 2007, and *V. inanoides* Hervé-Bazin, 1923. Among these taxa, *Sphiximorpha* Rondani, 1850, is the genus recorded for the first time in Korea. In total, three subfamilies, 16 tribes, 70 genera, and 180 species of the family Syrphidae are now officially

recognized for the Korean fauna. In order to facilitate their identification, we here provide specific diagnoses and photographs for all the species listed.

MATERIALS AND METHODS

The morphological terminology and interpretations follow McAlpine (1981) and Thompson (1999). Consecutive digital images in different focal planes (usually 10 or more shots per a specimen) were taken with a digital camera (Panasonic DMC FZ50) and the images were Z-stacked using Helicon Focus software (Helicon Soft, Ltd.). All the examined Korean specimens are deposited in the Division of Biological Science and Technology, Yonsei University, Wonju Campus, Korea (YSUW). The acronyms of the other institutions mentioned in the text are as follows: MHU, Museum of Hebei university, Baoding, Hebei, China; MNHNP, Museum National d'Histoire Naturelle, National Collection of Insects, 45, rue Buffon, Paris 75005, France; MSU, Zoological Museum of the Moscow State University, 6 Bolshaya Nikitskaya St., Moscow, Russia; SMF, Forschungsinstitut und Naturmuseum Senckenberg, Entomologische Section 1, Senckenberganlage 25, Frankfurt-am-Main, Hessen D-6000, Ger-

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***To whom correspondence should be addressed**

Tel: 82-33-760-2254, Fax: 82-33-760-2183

E-mail: hyhan@yonsei.ac.kr

many; ZISP, Zoological Museum, Russian Academy of Sciences, Universitetskaya, Naberzhnaya B-164, St. Petersburg, Russia.

SYSTEMATIC ACCOUNTS

Order Diptera Linnaeus, 1758
Family Syrphidae Latreille, 1802
Genus *Mallota* Meigen 1822

¹**Mallota rossica* Portschinsky, 1877 (Fig. 1A–D, M, N)

Mallota rossica Portschinsky, 1877: 175 (type locality: Russia; type ♂, ZISP); Sack, 1910: 34 (in Palearctic key); 1931: 336 (in Palearctic key); Peck, 1988: 202 (in Palearctic catalog).

Mallota auricoma Sack, 1910: 36 (type locality: Russia, Altai, Beresowski; holotype ♂, SMF); 1931: 333 (in Palearctic key); Violovitsh, 1978: 163 (in Siberian key); 1983: 128 (in Siberian key); Peck, 1988: 200 (in Palearctic catalog); Mutin and Barkalov, 1999: 449 (in Russian Far East key).

Mallota aino Violovitsh, 1952: 56 (type locality: Russia, Sakhalin, Dolinsk; holotype, ZISP); Peck, 1988: 200 (in Palearctic catalog); Mutin and Barkalov, 1999: 449 (in synonymy of *Mallota auricoma*)

Material examined. Korea: Gangwon-do: 1 ♀, Inje-gun, Buk-myeon, Mt. Seoraksan, Baekdamsa Temple, 26 Jun 2002, Kim HJ; 1 ♂, Wonju-si, Panbu-myeon, Seogok-ri, Mt. Baekunsan, from Yongsu-gol to 1,087 m peak, 37°14'59"N, 127°57'46"E, 19 Jun 1999, Han HY et al.; 1 ♂, ditto, 5 Jun 2005, Han HY, Lee HS; 1 ♂, ditto, 14 Jun 2005, Han HY et al.; 1 ♂, Hoengseong-gun, Dunnae-myeon, Mt. Cheongtaesan, Sapgyo-ri to 1,200 m peak, 9 Aug 2003, Lim OY, Lee HS.

Diagnosis. This species can be distinguished from other Palearctic members of the *Mallota* by the combination of the following characteristics (modified from Violovitsh, 1978): 1) eyes densely covered with hairs (Fig. 1A–D, M, N); 2) eyes holoptic in males and dichoptic in females (Fig. 1M vs. N); 3) flagellomere 1 wider than long (Fig. 1A–D, M, N); 4) face entirely black (Fig. 1M, N); 5) anterior half of scutum with dense pale yellow pruinosity, contrasting well with distinctly darker area behind (Fig. 1A–D); 6) femora black (Fig. 1B, D); 7) hind femur moderately thickened (Fig. 1B, D); 8) fore tibia with long black hairs posteroventrally; 9) abdominal tergites densely covered with long brownish hairs (Fig. 1A–D); and 10) abdominal tergite 2 laterally with

inner-facing brownish yellow triangular spots (Fig. 1A–D). Among the Korean *Mallota* species, *M. rossica* can be confused with similar looking *M. ambigua* and *M. dimorpha*, but can be easily distinguished by having predominantly yellow brown hairs while the latter two have predominantly yellow hairs.

Distribution. Korea, Russian Far East.

Remarks. This is the most rarely collected species of *Mallota* in Korea, with its distribution restricted to Russian Far East and Korea. Considering that all the five available specimens were collected in Gangwon-do, northern part of South Korea might be the southern limit of its distribution. The new Korean name (translated as “brown hoverfly”) is based on its general hair coloration, by which it's closely resembling species could be distinguished.

²**Mallota shatalkini* Mutin, 1999 (Fig. 1E–H, O, P)

Mallota shatalkini Mutin in Mutin and Barkalov, 1999: 448 (type locality: Russian Far East; holotype ♂, MSU).

Material examined. Korea: Chungcheongnam-do: 1 ♂, Gongju-si, Gyeryong-myeon, Mt. Gyeryongsan, Gapsa Temple, 26 May 1974; 1 ♀, Yeongi-gun, Jochiwon-eup, 18 May 1984, Lee JK. Gangwon-do: 1 ♂, Chuncheon-si, Namsan-myeon, Gangchon-ri, 6 Jun 1984, Han YS; 2 ♂, ditto, 24 May 1989, Lee JU; 1 ♂, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei University Wonju Campus, 37°16'56"N, 127°54'03"E, 27 May 1997, Byun HW, Choi DS; 1 ♀, ditto, 7 Jul 2006, Byun HW; 1 ♀, Wonju-si, Panbu-myeon, Seogok-ri, Daeyoungso-dong, 9 Jun 1996, Han HY, Byun HW. Gyeonggi-do: 1 ♀, Gapyeong-gun, Cheongpyeong-myeon, Dae-seong-ri, 17 May 1986, Choi SR; 1 ♂, Gwangju-si, Jungbu-myeon, eommi-ri, 23 May 1981, Oh KH; 1 ♂, Gwangju-si, Jungbu-myeon, eommi-ri, eungogae, 6 Jun 1981, Park OH; 1 ♂, Hanam-si, Mt. Geomdansan, 15 May 1977, Yu SH; 1 ♂, Namyangju-si, Jinjeop-eup, Palya-ri, 25 May 1986, Lee SJ; 1 ♂, Namyangju-si, Paldang, 17 May 1969, Hwang GC; 1 ♂, Namyangju-si, Sudong-myeon, Mt. Cheonmasan, 20 Apr 1971, Park KH; 1 ♂, ditto, 30 Apr 1972, Kim JI; 1 ♂, ditto, 17 Apr 1977, Kim IS; 1 ♂, ditto, 2 Jun 1984, Ham YJ; 1 ♀, Pocheon-si, Mt. Wangbangsan, 15 May 1979, Jo SY; 1 ♀, ditto, 16 May 1982, Kim SK; 1 ♀, Pocheon-si, Sohol-eup, Korea National Arboretum, 27 Jun 1981, Park DW; 1 ♂, Suwon-si, Gwonseon-gu, Seoul National University, 21 May 1992, Kim BT. Gyeongsangnam-do: 1 ♀, Hama-gun, Gunbuk-myeon, Ogok-ri, 31 May 1987; 1 ♀, Uiryeong-gun, Garye-myeon, Gabeul-ri, Mt. Jagulsan, 20 May 1990. Seoul: 1 ♂, Gangbuk-gu, Ui-dong, 5 May 1960.

Diagnosis. This species can be distinguished from other

Korean name: ¹*갈색쌍형꽃등에 (신칭), ²*꿀벌꽃등에 (신칭)

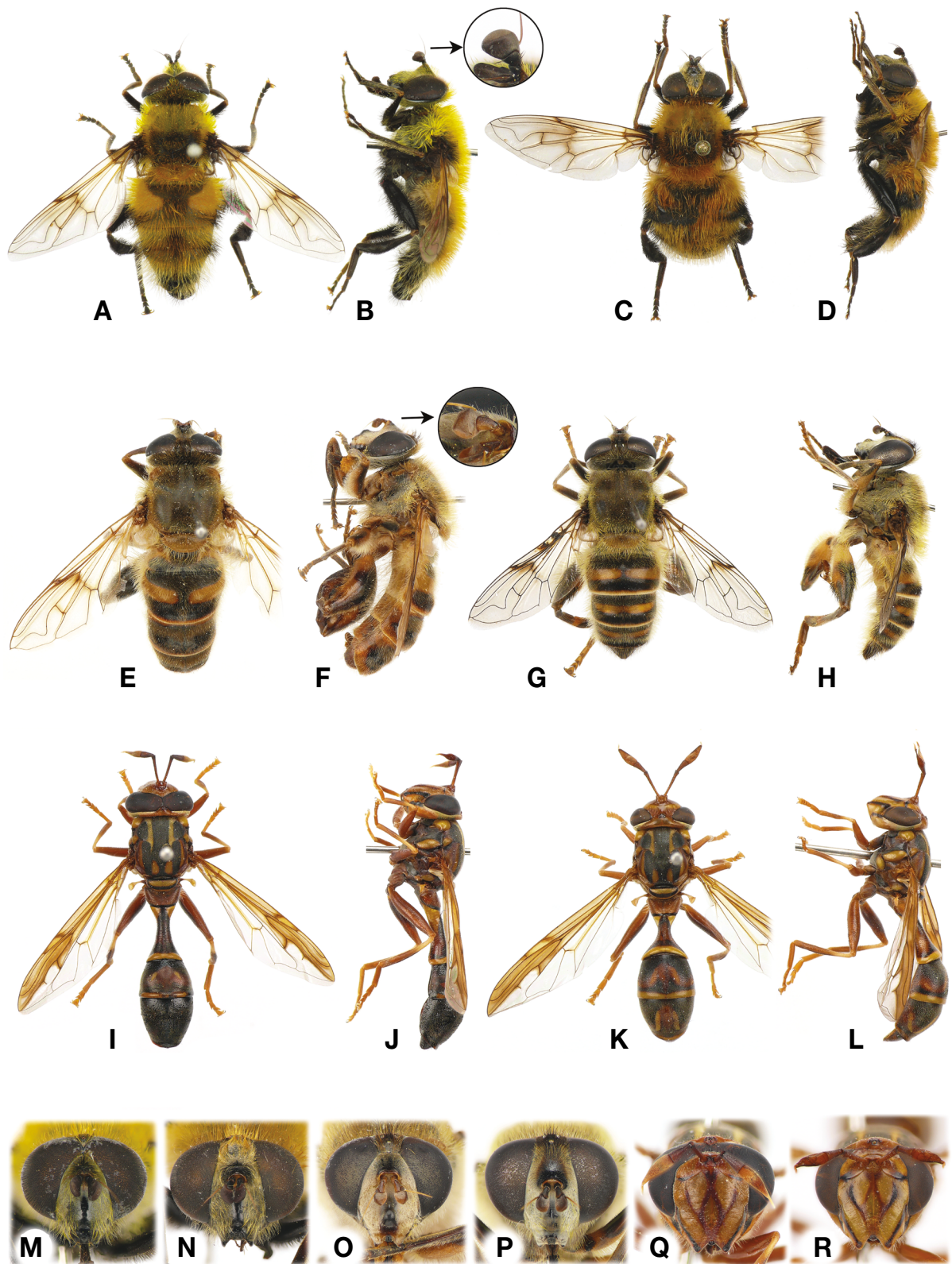


Fig. 1. *Mallota rossica*: A, B, M, Male (14 mm excluding antennae); C, D, N, Female (20.5 mm). *M. shatalkini*: E, F, O, Male (16.6 mm); G, H, P, Female (14.1 mm). *Sphinximorpha rachmaninovi*: I, J, Q, Male (15.1 mm); K, L, R, Female (13.4 mm).

Palearctic members of the *Mallota* by the combination of the following characteristics (modified from Violovitsh, 1978): 1) eyes bare (Fig. 1E–H, O, P); 2) eyes dioptic in both sexes (Fig. 1E, G, O, P); 3) face with vertically elliptic, brownish black, shiny and bare median stripe (Fig. 1O, P); 4) hind femur strongly thickened and curved with ventral spine at about apical 2/5 (Fig. 1F, H); and 5) abdominal tergite 2 with thick transvers, medially interrupted brownish yellow stripe (Fig. 1E–H). Among the Korean *Mallota* species, *M. shatal-kini* appears most similar to honey bee (Fig. 1E–H, O, P).

Distribution. Korea, Russian Far East.

Remarks. At a glance this species appears to be honeybee probably as a typical case of Batesian mimicry, and its Korean name (translated as “honeybee hoverfly”) is given accordingly.

Genus *Sphiximorpha* Rondani, 1850

¹**Sphiximorpha rachmaninovi* (Violovitsh, 1981)
(Fig. 1I–L, Q, R)

Shambalia rachmaninovi Violovitsh, 1981: 85 (type locality: Russia, Primorsky Krai; holotype ♀, ZISP); 1983: 151 (in Siberian key); Peck, 1988: 200 (in Palearctic catalog); Mutin and Barkalov, 1999: 476 (in Russian Far East key).

Material examined. Korea: Gangwon-do: 1♂, Wonju-si, Gwiraemyeon, from Cheoneunsa Temple to Mt. Sibjabong, 37°13'34"N, 127°54'36"E, 5 May 2004, Byun HW et al.; 1♂, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei University Wonju Campus, 37°16'56"N, 127°54'03"E, 16 May 1996, Byun HW; 1♂, ditto, 17 May 2000, Choi DS, Park CH, Kim DW; 2♀, ditto, 5 May 2002, Byun HW; 1♀, ditto, 16 May 2004, Byun HW; 1♀, ditto, 29 May 2004, Byun HW, Lee HS; 1♂, ditto, 30 May 2004, Byun HW; 1♀, ditto, 26 May 2006, Hwang SMR, Lim JS; 1♂, ditto, 23 Jun 2006, Choi DS; 1♀, ditto, 24 May 2009, Cha DJ, Lee HS. Gyeonggi-do: 1♂, Namyangju-si, Byeollae-myeon, Mt. Bulamsan, 3 Apr 1987, H. K. S.; 1♂, Paju-si, Gwangtan-myeon, Bogwangsa, 25 Apr 1975, An DI; 1♀, Pocheon-si, Sohol-eup, Korea National Arboretum, 20 May 1990, Gye JH. Seoul: 1♂, Seocho-gu, Mt. Cheonggyesan, 28 May 1986, Ko SH.

Diagnosis. This species can be distinguished from other Palearctic members of the *Sphiximorpha* by the combination of the following characteristics: 1) eyes bare (Fig. 1I–L, Q, R); 2) flagellomere 1 yellowish brown (Fig. 1I–L); 3) face brown with unique linear markings as in Fig. 1Q, R; 4) scutum brown with three thick black longitudinal stripes with lateral stripes interrupted at transverse suture (Fig. 1I, K); 5) scutellum black background with large widely semicircular

yellow area medially and narrow brown posterior margin (Fig. 1I, K); 6) hind femur brown with dark brown tinge at posterobasal half (Fig. 1I–L); 7) abdominal tergite 2 constricted in the middle (Fig. 1I, K); and 8) abdominal tergite 4 with 2 pairs of elongated yellowish spots (not clearly seen in Fig. 1I due to the orientation as well as the body fluid oozed out).

Distribution. Korea, Russian Far East.

Remarks. The abdomen of this species is similarly shaped as gourd bottle, and its Korean name (translated as “gourd bottle hoverfly”) is given accordingly.

Genus *Volucella* Geoffroy, 1762

²**Volucella bivitta* Huo, Ren and Zheming, 2007
(Fig. 2A–D, O, P)

Volucella bivitta Huo et al., 2007: 484 (type locality: Shaanxi, China; holotype ♂, MHU).

Volucella nigropicta (misidentification): Lee, 1998: 171 (color photograph).

Volucella coreana (misidentification): Mutin and Barkalov, 1999: 442 (in Russian Far East key).

Volucella sp. near *zonaria*: Choi et al., 2000: 144 (in fauna of Mt. Baegunsan & Yonsei University Wonju Campus).

Volucella sp.-2: Han and Choi, 2001: 132 (in Korean checklist).

Material examined. Korea: Chungcheongbuk-do: 1♀, Chungju-si, Jongmin-dong, Mt. Gyemyeongsan, 36°59'01"N, 127°58'53"E, 30 Jul 2003, Choi DS, Byun HW. Gangwon-do: 1♂, Donghae-si, Manu-dong, 37°33'23.52"N, 129°3'52.73"E, 19 Jul 2010, Suk SW, Lee YB, Lee HS; 1♀, Gangneung-si, Okgye-myeon, Mt. Maebongsan, 37°32'40"N, 129°01'12"E, 1 Sep 2009, Lee HS, Suk SW; 2♀, Gangneung-si, Wangsan-myeon, Godan-ri, 37°33'15.82"N, 128°48'18.75"E, 17 Aug 2010, Suk SW, Lee YB, Lee HS; 1♀, Hoengseong-gun, Anheung-myeon, Jigu-ri, 37°26'7.15"N, 128°11'32.85"E, 24 Sep 2010, Suk SW, Lee YB, Lee HS; 1♂, Hoengseong-gun, Dunnae-myeon, Mt. Cheongtaesan, Sapgyo-ri to 1,200 m peak, 37°30'40"N, 128°18'01"E, 15 Aug 2001, Choi DS et al.; 1♀, ditto, 1 Aug 2006, Byun HW, Lim JS, Cha DJ; 2♀, Hongcheon-gun, Nae-myeon, Bangnae-ri, Mt. Maenghyeonbong, 10 Sep 2000, Han HY, Ro KE; 1♂1♀, Hongcheon-gun, Nae-myeon, Changchon-ri, North valley of Mt. Gyebangsang, 37°44'39"N, 128°26'58"E, 6 Aug 1997, Han HY, Byun HW, Choi DS; 1♂, Hongcheon-gun, Nae-myeon, Mt. Gachilbong, from Sambongyaksu to 1,240 m peak, 37°52'04"N, 128°27'43"E, 24 Aug 1997, Han HY, Byun HW, Choi DS; 1♂, ditto, 27 Jul

Korean name: ¹*호리병꽃등에 (신칭), ²*담은참대모꽃등에 (신칭)

2009, Jung JM, Lee YB; 2 ♀, Hongcheon-gun, Nae-myeon, Mt. Gyeongbansan, Unduryeong, 37°43'41"N, 128°27'55"E, 14 Aug 1998, Byun HW, Choi DS, Kim SK; 1 ♀, ditto, 12 Aug 2003, Byun HW, Lim OY, Lee HS; 2 ♀, Hwacheon-gun, Sanae-myeon, Mt. Gwangdeoksan from Gwangdeok-ri to 1,046 m peak, 29 Aug 2000, Park CH, Kim DW; 1 ♀, Hyeol-dong, Mt. Taebaegsan from Yuilsa Temple to 1,560 m peak, 29 Aug 1999, Choi DS, Park CH; 3 ♀, ditto, 12 Aug 2000, Choi DS, Kim SK, Park CH; 1 ♀, Inje-gun, Girin-myeon, Hyeon-ri, 9 Sep 2007, Lee HS et al.; 1 ♂, Inje-gun, Girin-myeon, Mt. Jeombongsan, from Jindong-ri to 1,424 m peak, 7 Aug 1997, Han HY, Byun HW, Choi DS; 1 ♀, ditto, 14 Aug 1997, Han HY, Byun HW, Choi DS; 1 ♀, Jeongseon-gun, Gohan-eup, Mt. Hambaeksan, From Manhang-jae to 1,573 m peak, 14 Aug 1999, Han HY et al.; 1 ♀, ditto, 1 Aug 2003, Choi DS et al.; 2 ♂, Jeongseon-gun, Nam-myeon, Mt. Mindungsan, form Yupyeong-ri to 1,119 m peak, 37°16'15"N, 128°46'30"E, 2 Aug 2001, Han HY, Ro KE; 1 ♂, ditto, 9 Aug 2001, Han HY, Ro KE; 1 ♂, ditto, 4 Aug 2005, Han HY et al.; 1 ♂ 1 ♀, ditto, 13 Aug 2005, Han HY et al.; 1 ♀, ditto, 25 Aug 2009, Suk SW, Lee HS; 2 ♂, ditto, 28 Jul 2010, Lee HS, Lee YB; 1 ♀, Pyeongchang-gun, Bangnim-myeon, Ungyo-ri, 24 Sep 2010, Suk SW et al.; 1 ♂, Samcheok-si, Dogye-eup, Dogye-ri, from Amisa Temple to Dusugol, 31 Jul 2003, Choi DS et al.; 4 ♀, Wonju-si, Gwirae-myeon, from Cheoneunsa Temple to Mt. Sibjabong, 37°13'34"N, 127°54'36"E, 18 Aug 1997, Han HY, Byun HW, Choi DS; 1 ♂, ditto, 22 Jul 2007, Byun HW, Choi DS; 1 ♂, Wonju-si, Haenggu-dong, Mt. Chiaksan, Hyangno-bong from Bomoonsa Temple, 23 Jul 1998, Byun HW, Choi DS, Kim SK; 1 ♀, Wonju-si, Heungeop-myeon, Maeji-ri, Hoechon, 6 Aug 1999, Choi DS et al.; 1 ♀, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei University Wonju Campus, 37°17'10"N, 127°54'01"E, 26 Aug 1998, Byun HW; 1 ♀, ditto, 26 Sep 2003, Lim OY; 1 ♀, ditto, 31 Aug 2007, Suk SW; 1 ♂, Wonju-si, Panbu-myeon, Seogok-ri, Mt. Baekunsan, from Yongsu-gol to 1,087 m peak, 37°14'59"N, 127°57'46"E, 12 Jul 1998, Choi DS; 3 ♂, ditto, 20 Jul 1998, Choi DS; 1 ♀, ditto, 24 Jul 1998, Choi DS, Kim SK, DE Kim; 1 ♀, ditto, 26 Jul 1998, Choi DS, Kim SK; 7 ♂ 2 ♀, ditto, 27 Jul 1998, Byun HW, Choi DS, Kim SK; 1 ♀, ditto, 27 Jul 1998, Han HY, Choi DS, Kim SK; 2 ♀, ditto, 13 Aug 1998, Byun HW, Choi DS, Kim SK; 1 ♀, ditto, 17 Aug 1998, Byun HW, Choi DS, Kim SK; 1 ♀, ditto, 20 Aug 1998, Han HY, Ro KE; 1 ♂ 1 ♀, ditto, 5 Aug 1999, Choi DS et al.; 1 ♂ 3 ♀, ditto, 17 Aug 1999, Han HY, Choi DS, Kim SK; 2 ♀, ditto, 23 Aug 1999, Choi DS, Park CH; 2 ♀, ditto, 4 Sep 1999, Choi DS, Park CH; 1 ♂, ditto, 2 Aug 2000, Choi DS, Park CH, Kim DW; 1 ♂, ditto, 25 Jul 2002, Choi DS et al.; 1 ♂, ditto, 25

Jul 2002, Choi DS et al.; 3 ♂ 2 ♀, ditto, 4 Aug 2003, Lim OY et al.; 1 ♂, ditto, 13 Aug 2004, Lim OY, Lee HS; 1 ♀, ditto, 25 Aug 2005, Byun HW et al.; 1 ♀, ditto, 14 Aug 2006, Choi DS et al.; 1 ♂, ditto, 30 Jul 2013, Suk SW, Lee YB, Kim DH; 1 ♀, Wonju-si, Sillim-myeon, Mt. Chiaksan, Seongnam-ri to 1,181 m, Namdaebong peak, 20 Aug 2001, Choi DS, Lim OY; 1 ♀, ditto, 31 Jul 2002, Choi DS, Byun HW, Lee HS; 1 ♀, ditto, 30 Jul 2003, Lim OY, Lee HS. Gyeongsangbuk-do: 2 ♀, Uljin-gun, Onjeong-myeon, Onjeong-ri, Mt. Baegamsan from Oncheondong to 1,003 m peak, 16 Aug 1999, Han HY et al. Gyeongsangnam-do: 1 ♂, Geoje-si, Dongbu-myeon, Hakdong-ri, 6 Aug 2004, Kim TW. Jeollabuk-do: 2 ♂, Jangsu-gun, Jangsu-eup, Doeksan-ri, Mt. Jangansan, 35°37'14"N, 127°34'14"E, 25 Aug 2008, Lee HS, Jung JM.

Diagnosis. This species can be distinguished from other Korean members of the *Volucella* by the combination of the following characteristics: 1) head entirely yellowish brown (Fig. 2A–D, O, P); 2) eyes holoptic in male (Fig. 2A, O); 3) scutellum with strong marginal setae (Fig. 2A–D); 4) areas surrounding wing crossveins mostly hyaline (Fig. 2A, C); and 5) posterior 1/2 of abdominal tergite 2 dark brown (Fig. 2A, C).

Distribution. Korea, Russian Far East, China.

Remarks. In Korea, flies of *V. bivitta* are often found on the flowers of *Zanthoxylum schinifolium* Siebold & Zucc. together with *V. linearis* in summer. This species superficially resembles *V. coreana*, and its Korean name (translated as “hoverfly near *V. coreana*”) is given accordingly.

1Volucella inanoides* Hervé-Bazin, 1923
(Fig. 2E–N, Q, R)**

Volucella inanoides Hervé-Bazin, 1923: 256 (Type-locality: Sichuan, China; holotype ♂, MNHNP); Sack, 1931: 244 (redescription); Zimina, 1961 (in Palaearctic key); Bańkowska, 1998: 170 (North Korea, redescription).

Volucella sp. near *inanoides*: Choi et al., 2000: 144 (in fauna of Mt. Baegunsan & Yonsei University Wonju Campus).

Volucella sp.-1: Han and Choi, 2001: 130 (in Korean checklist).

Volucella nigropicta (misidentification): Kim et al., 1994: 116 (in fauna of Mt. Gwangdeoksan); Kim, 1995a: 176 (in fauna of Mt. Sobaeksan); 1995b: 145 (in fauna of Byeonsan Peninsula); Lee, 1998: 171 (color photo); Park, 1998: 86 (in fauna of Gangwon-do).

Volucella sexmaculata (misidentification): Kim, 1971: 865 (redescription); 1980a: 294 (in Korean distribution); Kim and Kim, 1971: 168 (in fauna of Mt. Odaesan & Sogeu-gang); 1974: 122 (in fauna of Mt. Naejangsan); Kim, 1975:

Korean name: 1*넓은이마대모꽃등에(신칭)

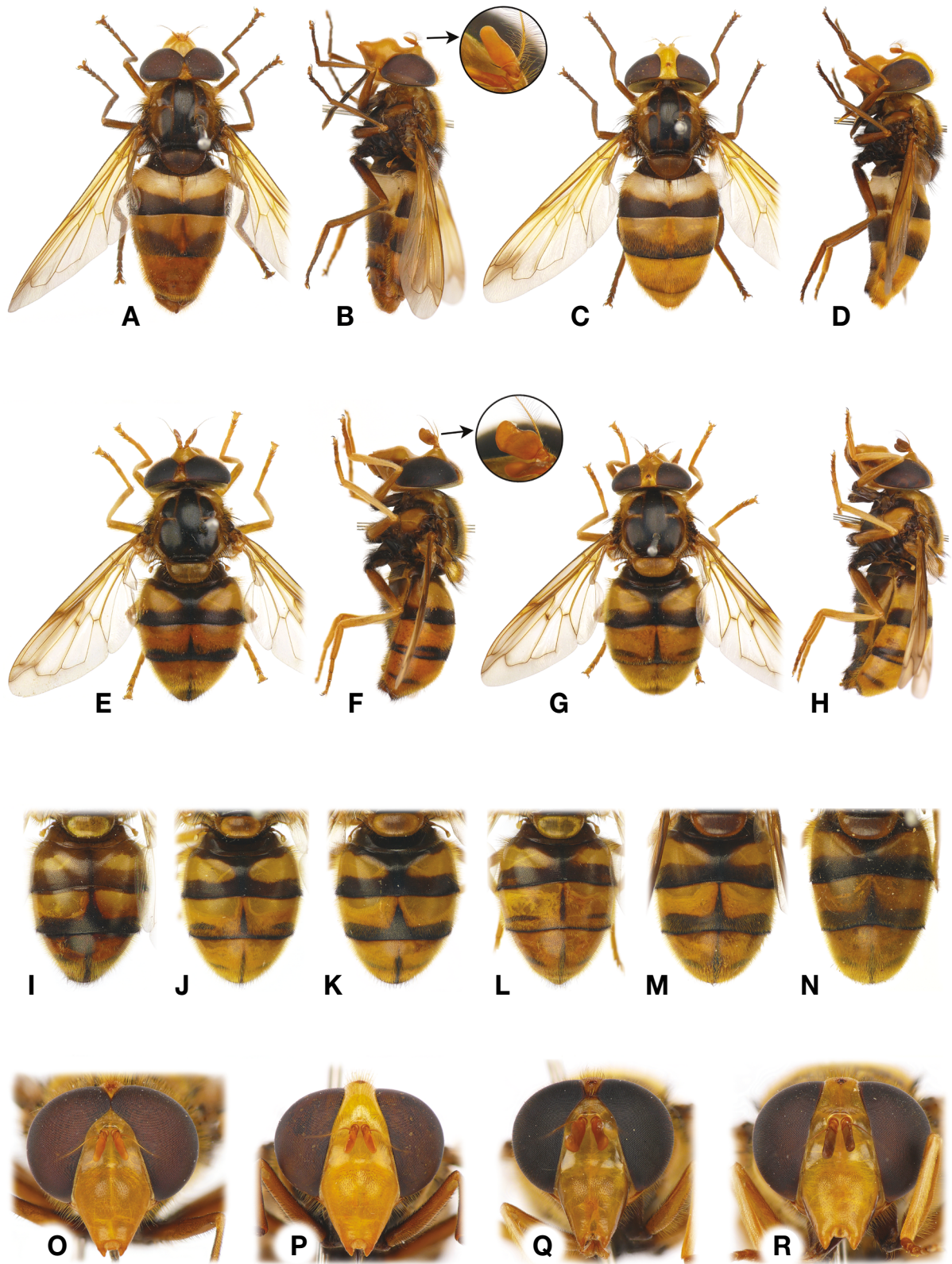


Fig. 2. *Volucella bivitta*: A, B, O, Male (17 mm excluding antennae); C, D, P, Female (17.6 mm). *V. inanoides*: E, F, I-K, Q, Male (15.5 mm); G, H, L-N, R, Female (19.8 mm).

41 (in Korean checklist); 1980b: 385 (in Korean checklist); Nam and Kim, 1983: 132 (in fauna of Mt. Jirisan); Kim and Park, 1984: 42 (in anatomical study); Kim et al., 1991a: 107 (in fauna of Mt. Jirisan); Kim et al., 1991b: 187 (in fauna of Mt. Songnisan); Park et al., 1993: 208 (in fauna of Mt. Jirisan).

Volycella sexmaculata (misidentification, misspelling): Yoon et al., 1990: 123 (in fauna of Mt. Gayasan).

Eristalis cerealis (misidentification): Lee, 1998: 174 (color photograph).

Material examined. Korea: Chungcheongbuk-do: 4♂, Chungju-si, Jongmin-dong, Mt. Gyemyeongsan, 36°59'01" N, 127°58'53"E, 2 Jul 2003, Choi DS, Lim OY, Lee HS; 1♂, ditto, 18 Jul 2007, Lim JS, Lee YB, Jung JM; 1♀, Jecheon-si, Hansu-myeon, Mt. Woraksan, 11 Jul 1991, Kim UK. Gangwon-do: 1♂, Chuncheon-si, Sindong-myeon, Palmi-ri, 4 Jun 2006, Choi DS et al.; 1♂, Hongcheon-gun, Hwachon-myeon, Seongsan-ri, 2 Jun 2006, Choi DS et al.; 5♂1♀, Samcheok-si, Dogye-eup from Gwangmyeongsa Temple to Sangdeok-ri, 8 Jun 2003, Choi DS et al.; 1♂, Samcheok-si, Dogye-eup from Sinbangtae to Mt. Dohwasan (925 m), 8 Jun 2003, Choi DS et al.; 1♀, Wonju-si, Heungeop-myeon, Maeji-ri, Hoechon, 12 Jun 1998, Han HY, Kim SK; 1♂, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei University Wonju Campus, black + mercury vapor light trap, 37°17'10"N, 127°54'01"E, 21 Jun 2009, Han HY et al.; 1♀, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei University Wonju Campus, 37°17'10"N, 127°54'01"E, 25 Jun 1996, Byun HW; 1♀, ditto, 7 Jul 1997, Byun HW, Choi DS; 1♀, ditto, 8 Jul 1997, Byun HW; 1♀, ditto, 5 Aug 1997, Byun HW; 1♂, ditto, 3 Jun 1998, Mo CS, Kim KI; 1♀, ditto, 12 Jun 1998, Byun HW; 3♂6♀, ditto, 14 Jun 1998, Byun HW, Choi DS, Kim SK; 1♂1♀, ditto, 15 Jun 1998, Byun HW; 1♀, ditto, 23 Jun 1998, Byun HW; 2♂1♀, ditto, 27 Jun 1998, Choi DS, Kim SK; 1♀, ditto, 15 Jul 1998, Byun HW, Choi DS; 1♂, ditto, 25 Jun 1999, Byun HW; 1♀, ditto, 11 Jun 2000, Kim SK, Park CH; 1♂, ditto, 14 Jun 2000, Park CH; 1♂, ditto, 18 Jun 2000, Park CH; 1♀, ditto, 14 Jun 2002, Lim OY, Lee HS, Lim MH; 1♂, ditto, 26 Jun 2002, Lim OY; 6♂1♀, ditto, 1 Jun 2003, Byun HW; 3♂, ditto, 3 Jun 2003, Byun HW; 4♂, ditto, 3 Jun 2003, Choi DS, Lee HS; 10♂1♀, ditto, 4 Jun 2003, Choi DS; 4♂1♀, ditto, 5 Jun 2003, Byun HW; 1♂, ditto, 9 Jun 2003, Choi DS, Lee HS; 1♂, ditto, 13 Jun 2003, Byun HW; 1♂1♀, ditto, 15 Jun 2003, Lim OY; 1♀, ditto, 23 Jun 2004, Choi DS, Byun HW; 1♂, ditto, 18 Jun 2005, Merz B; 1♂, ditto, 20 Jun 2005, Byun HW; 1♂, ditto, 9 Jun 2006, Hwang SMR, Lim OY; 1♀, ditto, 27 Jun 2006, Choi DS, Byun HW, Lim JS; 1♀, ditto, 24 Jul 2006, Lim JS; 1♀, ditto, 31 Aug 2006, Byun HW; 1♂, ditto, 30 Jun 2008, Lee YB; 2♀, ditto, 7

Jul 2008, Suk SW; 2♂, ditto, 8 Jun 2009, Lee YB; 2♂, ditto, 8 Jun 2009, Suk SW; 1♂1♀, ditto, 19 Jun 2009, Suk SW et al.; 1♂, ditto, 3 Jul 2009, Lee HS et al.; 1♂1♀, ditto, 1 Jul 2010, Lee HS; 1♂, ditto, 12 Jun 2011, Han HY, Ro KE; 1♂1♀, ditto, 28 Jun 2011, Lee HS et al.; 1♂, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei University Wonju Campus, swept ex *Euonymus japonicus*, 37°17'10"N, 127°54'01"E, 30 Jun 2003, Lee HS. Gyeonggi-do: 1♂, Bogwangsa Temple, 4 Jul 1978, Kim YJ; 1♀, Hanam-si, Namhansanseong, 31 Jul 1993, Yang JS; 1♀, ditto, 9 Jul 1994, Park JM; 1♀, Namyangju-si, Hwado-eup, Mt. Cheonmasan, 13 Sep 1994, Jeong UH. Gyeongsangbuk-do: 1♂, Andong-si, Giran-myeon, Goran-ri, Mt. Gyemyeongsan, 1 Jun 2012, Suk SW, Kim DH, Lee HS; 2♀, Cheongsong-gun, Hyeonseom-myeon, Galcheon-ri, 29 Aug 2011, Suk SW et al.. Gyeongsangnam-do: 1♂, Namhae-gun, Samdong-myeon, Bonghwa-ri, Pyeonbaek Recreational Forest, 20 Jun 2000, Jeon JS; 1♀, ditto, 20 Jun 2000, Ji SS; 10♂1♀, Yangsan-si, Yongdang-dong, Mt. Daeunsan, 3 Jul 2009, Lee HS et al.. Jeollabuk-do: 1♀, Buan-gun, Byeonsan-myeon, 26 Jun 1991, Kim SM; 1♂, Namwon-si, Sannae-myeon, Mt. Jirisan Baemsagol (646 m) Malaise Trap (70% EtOH); 26 Jun-11 Jul 1991, Ku DS. Ulsan-si: 1♀, Ulju-gun, Ungchon-myeon, Eunhyeon-ri, Mujaechi 1 marsh, 7 Jul 2000, Han KR; 1♂, ditto, 7 Jul 2000, Kim TW; 1♂, ditto, 7 Jul 2000, Lee SJ.

Diagnosis. This species is highly variable in body size and abdominal color pattern (Fig. 2E-N), but can be readily distinguished from the Palaearctic congeners by the wide flagellomere 1 (Fig. 2F, H, Q, R) as well as dichoptic male eyes (Fig. 2E, Q).

Distribution. Korea, China.

Remarks. This species were often found on sap runs of oak trees during summer months. This is only species of the Korean *Volucella* with separated compound eyes in males, and its Korean name (translated as "wide frons hoverfly") is given accordingly.

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